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ENERGY INTERPRETATION
A GUIDE FOR IDAHO STATE PARKS

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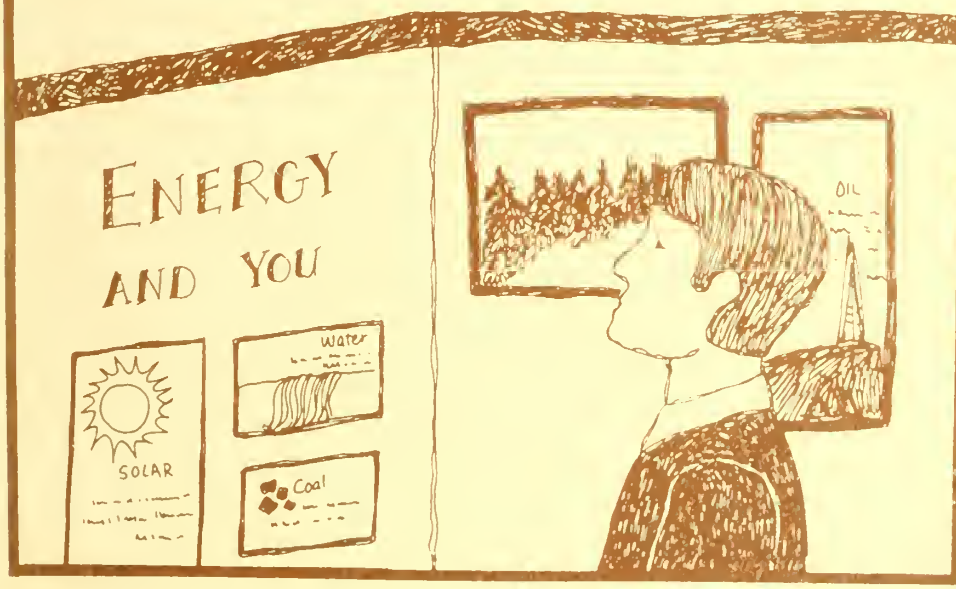

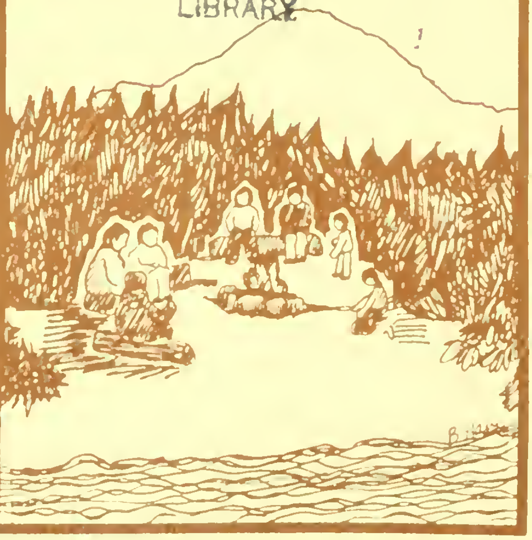

Energy Interpretation

A Guide for Idaho State Parks

by

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Preface

There is no escape from energy education. When we pay a rising utility bill, we learn an economic lesson, and the debates over a national energy policy teach energy politics. Buying gasoline for our automobiles, we become knowledgeable about how fast and far they go — a lesson in engineering. Indeed, there is no escape from energy education, since "the energy available to man limits what he can do and influences what he will do" (Cottrell, 1955).

Energy interpretation is another matter. Faced with the same facts concerning nuclear plant safety, scientists come to opposite conclusions. How are we to interpret this? How many can grasp a sum like 37 million barrels of oil (equivalent to the nation's daily energy demand for 1977)? What about concepts like entropy, replacement cost, retrofitting, and so forth? And what of OPEC, passive solar, and synthetic fuels?

This guidebook is about energy interpretation. Its purpose is to aid interpreters in presenting energy ideas to the visitors of Idaho state parks. We feel parks are appropriate places for energy interpretation, for they are the "environmental classrooms" of the state. Visitors come willingly, to experience and enjoy the natural and historic areas of Idaho. The energy lessons learned at these special places, if interpreted effectively, are likely to be important.

Gary E. Machlis
Sam H. Ham
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Preface to Second Edition

This is the second edition of "Energy Interpretation: A Guide for Idaho State Parks". Its purpose is somewhat different than the original guide, so a brief explanation is in order.

In the fall of 1979, the Cooperative Park Studies Unit at the University of Idaho contracted with the Idaho Office of Energy to prepare a guide for energy interpretation, to be used through the state park system. As we began to work, it became clear that much of the material could be useful in a wider field -- national parks, other state systems, county parks, nature centers, museums, schools and so forth. Aiding Idaho State Park interpretive efforts remained our main objective, however.

This edition has been prepared for that wider audience of interpreters, environmental educators, and teachers who have an interest in energy interpretation. All of the major ideas and most of the examples will be relevant to many interpretive contexts. We have kept Chapter Four, which is a profile of Idaho's energy patterns, as an example of how energy data can be used to advantage in energy interpretation. Such information is available for all states and at the national level.

We would like to thank John Teichert, Energy Coordinator for the Pacific Northwest Region of the National Park Service, for his office's support of this edition.

Gary E. Machlis

Sam H. Ham

March, 1981

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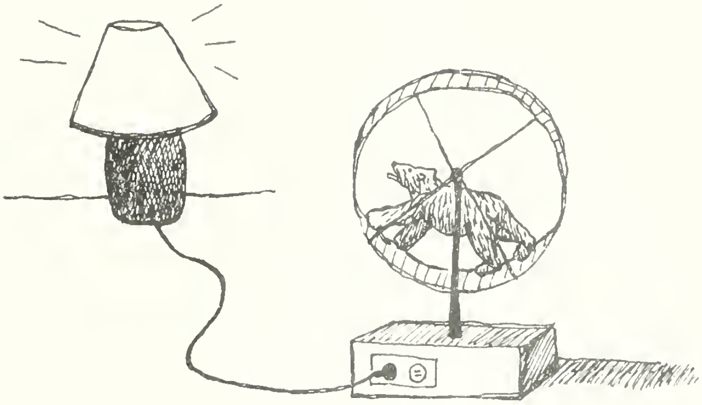


1. Introduction: The Benefits of Energy Interpretation

This is a guidebook for park interpreters interested in energy interpretation. We define energy interpretation as the presentation of energy-related ideas in such a way as to make these ideas meaningful and important to visitors. "Meaningful" will require an effort to relate facts and concepts to visitors' personal experience. "Important" requires that the information be relevant, accurate, and lead to increased awareness and understanding.

There are several reasons for energy interpretation. First, intelligent energy policy requires an informed public. Many of our energy decisions are public ones — where to site a nuclear facility, whether to approve a utility rate increase, the vote on a windfall profits tax. Other energy decisions are consumer choices — such as whether to install a wood stove. These public and consumer choices help form our energy policy. Energy interpretation, in that it may increase the public's ability to make informed choices, is important to this policy development.

Second, energy interpretation can lead to energy conservation. Innovative energy activities are diffused slowly through society, and "persuasive communication" is seen as a critical factor (Somers and Clark, 1979). For example, interpretive publications that describe ways to reach a state park without an automobile may encourage use of mass transit, and result in real energy savings. An exhibit focusing on insulation may provoke some visitors to consider insulating their homes. Energy interpretation for children may influence their behavior when adults, leading to greater conservation activities and energy-efficient lifestyles.

A third reason for energy interpretation is that park-going is an energy-intensive activity. For parks to function, large energy flows are

necessary — electricity and diesel fuel to light and heat the buildings, gasoline to drive visitors' autos and park equipment, coal to fire the factories that build recreational vehicles, and wood, water and other energy resources. Because the recreation and tourism industry is so energy-intensive, energy interpretation may help visitors understand how future changes may impact their leisure activities.

Fourth, *interpretation has traditionally dealt with ecological issues such as energy*. From the first interpretive efforts of the Park Service and Forest Service, to the establishment of interpretation in state park operations, interpreters have treated themes related to the natural world. Photosynthesis, biological cycles, and food chains have been popular topics, along with the role of environment and resources in historical events. Hence, energy interpretation is not new, and has a place in many kinds of interpretive efforts.

These benefits associated with energy interpretation are significant. An informed public is an advantage to dealing with the energy "crisis," and energy interpretation may lead to increased supplies through conservation. Such programs can help explain park management strategies to visitors and encourage visitor cooperation. Energy interpretation can enrich traditional interpretive programs, increasing the quality of the park experience. Therefore, an understanding of effective energy interpretation is a valuable tool for outdoor recreation managers, environmental educators, and interpreters.

This guide is organized into six parts. In the next section, we suggest that energy interpretation is not fundamentally different from other forms of interpretation, and that basic principles apply. These principles are listed, and examples are provided to illustrate their use. In Section Three, we discuss the unique problems associated with energy interpretation and suggest practical solutions.

Section Four deals with energy interpretation in Idaho. A profile of Idaho's energy situation is provided, including information on energy production, consumption and Idahoan attitudes toward energy development. The application of this information to energy interpretation in Idaho is discussed. We conclude in Section five by suggesting there is a "rhetoric of

energy" that interpreters must consider when developing programs. The appendix (Section Six) includes a lengthy annotated bibliography.

2. Basic Interpretive Principles

The problems related to energy interpretation in Idaho State Parks are no different than those associated with other forms of interpretation, e.g. cultural interpretation, sky interpretation, marine interpretation, and others. Therefore, an important first step in providing energy interpretation is to rethink basic interpretive principles and apply these principles to the topic of energy.

Many principles for interpretation have been proposed (refer to the annotated bibliography for sources). Among these, five basic ideas emerge:

1. Interpretation is not instruction.

As Alan Wagar (1974) pointed out, few park visitors go to recreation areas specifically to obtain information. Those that do, it may be argued, share an intrinsic motivation that makes interpretation easy. The majority of visitors seek other forms of enjoyment, and are often uninterested in interpretation if it is presented in a manner that reminds them of traditional educational experiences (Washburne and Wagar, 1972; Ham, 1978).

Although the reasons for this are unclear, it appears that people view leisure settings in direct contrast to other environments, e.g. the job or classroom, where demands on one's time are obligatory (Cheek and Burch, 1976). Instruction may be perceived as being unacceptable by many park visitors, since it reminds them of other situations in which they are not free to determine their activities. Visitors expect an informal atmosphere in leisure settings, and the success of interpretation hinges on how well it meets such expectations (Field & Wagar, 1973).

> Example: Rather than speak to an audience seated in rows of chairs, an interpreter develops a presentation on energy conversion to encourage audience interaction and participation. He sets up common conversion situations in the room (e.g. water boiling, sun coming through a window, and decomposing cut grass) and shows the group how to measure the heat lost through each conversion and compare it with the others. Through a questioning strategy and group discussion, the interpreter helps the visitors devise ways of harnessing some of the heat.

2. Interpretation must be rewarding to audiences.

The fact that recreationists are, in general, pleasure-seekers, underscores their expectation for relaxed, informal interpretation. Park visitors *expect* to enjoy themselves and therefore can be predicted to spend their time on activities perceived to yield the greatest amounts of immediate satisfaction (Field & Wagar, 1973). Inasmuch as they are a noncaptive audience, free to pay attention or not pay attention, visitors must *enjoy* interpretation or it will neither attract nor hold their attention. The interpreter needs a provocative technique and entertaining style to maintain audience interest. Likewise, exhibits, brochures and other non-personal interpretive devices must have built into them some form of "payoff" for visitors before they (the visitors) will make use of these tools.

The exact nature of the payoff to visitors can vary dramatically: getting the right answer on a quizboard, listening to humorous or thought-provoking presentations, engaging in desired social interaction, or participating in a presentation or interactive exhibit (Ham, 1978; Field & Wagar, 1973; Wagar, 1972).

To be effective in providing these rewards, it is a good idea for interpreters to continually "practice" being a visitor. Interpreters often forget what visitors find enjoyable in park activities, and design interpretation without full knowledge of how it will be perceived by the audience. It may help for interpreters to monitor each other's presentations, not as park employees, but as visitors. Similarly, visiting other nearby parks or museums, and reading outside brochures, leaflets and other printed messages are good ways of practicing being a visitor.

> *Example*: Rather than produce a static exhibit which simply tells visitors about the heat-absorbing qualities of various animal skins, the interpreter develops an interactive display in which visitors can physically touch the skins and discern for themselves the amount of heat each retains. Further, visitors can test themselves over important concepts by answering questions with correct answers provided under hinged flaps. The interpreter makes plans to visit a nearby science museum to experience first-hand other types of interactive exhibits so he can better assess the adequacy of his own.

3. Interpretation should draw upon common human experiences to add meaning and relevance to the information presented.

A problem in all forms of interpretation is structuring the message in a way that is both appealing and understandable to diverse audiences. Much of the scientific and cultural significance of our park areas is the subject of specialized vocabularies, and most visitors are neither proficient in this language nor interested in learning it. It may be argued, in fact, that the visitors' primary interests lie in those aspects of their park experiences that relate directly to themselves or their past experiences (Tilden, 1957).

Writing about this phenomenon, Freeman Tilden developed one of the most important principles relied upon by interpreters today:

> Any interpretation that does not somehow relate what is being displayed or described to something within the personality of experience of the visitor will be sterile. (1975:11).

Energy, like other topics for interpretation, is replete with its jargon and technicalities. Whereas in nature interpretation the task is to make concepts like nitrogen fixation and eutrophication meaningful and interesting to people, energy interpretation brings to forefront terms such as BTU's, kilocalories and retrofitting, and processes like conversion, gasification and convection. We feel that the ability to translate the significance of energy relations into language familiar to the layman is perhaps the most important skill an interpreter can possess. There is no question that energy has an important bearing on the shape of human life. The problem for interpreters, therefore, is not to "teach" park visitors its specialized language but rather to illustrate the variety of human events and behaviors that are impacted by energy. Research strongly suggests that if interpreters concentrate their examples on situations and experiences common to all visitors (e.g. the home, family, automobile, etc.), and illustrate them in familiar terms, the public stands a far greater chance of finding energy interpretation interesting, understandable and relevant (Ham, 1979; Dick, McKee and Wagar, 1974).

Thus, energy interpretation must make use of common knowledge,

experiences and interests to make energy relations relevant and meaningful to park visitors. By way of carefully chosen metaphors, analogies and illustrative examples, interpreters can take much of the mystique out of energy and instead send visitors home with provocative personal insights into the importance of energy in their lives.

> Example: An interpreter wants the audience to better appreciate the importance of using energy efficiently. She does several things: (1) she introduces the concept of the food pyramid and shows visitors how energy is utilized as it flows upward through the system; (2) she then shows how the same principle applies to human consumption of food by tracing the energy used from the growing of a vegetable to a retail outlet, to the consumer driving to the store to buy it, and to cooking and eating it; (3) next, the interpreter traces the energy used when the vegetable is grown at home and demonstrates that the latter is many times more efficient because only three steps are required (growing, cooking and eating). No technical jargon is used, yet the audience leaves with a concept which will be reinforced each time frozen vegetables are seen at the store or prepared at home.

4. Each interpretation should be purposive and address a whole concept or idea.

One of the most common difficulties confronted by interpreters is that of deciding on the purpose and scope of presentations and displays. Often interpretation starts from a moment of inspiration, then evolves without purpose or direction because no real objective was in the interpreter's mind. Usually, this type of interpretation leads to audience confusion -- the result being that no real message is communicated.

Gestalt psychology has given rise to the concept of "pragnänz," which loosely translated means "unity" or a whole. The basic tenet of the gestalt view is that humans perceive their world in discernible units or wholes which provide meaning, order, and predictability to their experiences (Sampson, 1971). Thus, a natural human tendency is to search for pragnänz in all events and stimuli. When interpretation consists of a collection of loosely connected ideas, it is difficult for visitors to process it because no organizational (conceptual) framework exists. On the other hand, if the information presented revolves around a well defined theme and is selected on the basis of a predetermined objective, the audience

is likely to find the message clear and succinct.

An interpretive objective is a statement of intent in terms of desired audience understanding. For instance, the objective of a brochure on subalpine energy relations might be "for the audience to understand the relationship between plants' adaptive mechanisms and their ability to survive in the harsh subalpine climate." A theme is a statement that sums up the intended message. As Lewis (in press) suggests, after any form of interpretation the audience should be able to express what was said in a single sentence. This sentence would be the key idea or "so what" of the information; it is the moral to the story. To continue the example introduced above, the theme of the brochure might be:

> "Plants have adapted in many ways to cope with the harsh subalpine climate, including the development of heat retaining pigments, annual lifespans, and rapid reproductive cycles."

With this objective and theme in mind, an interpreter would develop a unified presentation.

> Example: An interpreter wishes to give a guided trail walk entitled, "A Behind-the-scenes Look at Growth in the Forest." Her objective is to show visitors that the ways energy affects forest life is no different than the ways in which it affects life in an industrial city. She selects as her theme: The key to sustained life is that very little energy is transformed to a nonusable form. To develop her theme (and accomplish her objective), the interptleter shows visitors forest plants and explains how energy is utilized, released and used by other life forms who in turn recycle usable energy into the system. At each stop on the trail, she selects an analogous example from industrial society which illustrates the resistance of industrial technology to this basic law of nature. At the end she summarizes the problems resulting from this counteractive behavior and suggests that natural areas, such as parks, are important as specimens of the way natural processes are supposed to operate.

5. Where possible interpretation must take into account audience characteristics.

Interpretation is usually aimed at a diverse audience with a wide range of social and physical characteristics. Nevertheless, some types of homogeneous groups occur frequently enough in leisure settings to warrant

special consideration. Three of these are family groups, childrens' groups and the aged. Audiences comprised predominantly of any of these special populations will respond more positively if interpretation is geared toward the group's special characteristics.

Families are the most common social group in many leisure settings, including parks (Field, 1971) and represent an important audience segment. Among their other special characteristics, it has been widely suggested that families use leisure settings to pass on family culture and perpetuate traditions (Machlis, 1975; Cheek & Burch, 1976). One common behavior is parents teaching their offspring. Interpretation can take advantage of this tendency by encouraging parent-child interaction.

The number of senior citizens attending park interpretive activities is frequently underestimated by interpreters (Bultena, et al., 1977). For this reason, interpreters should pay closer attention to the special needs of the aged park goers. For instance: (1) many retirees have a high degree of familiarity with park information because of longer than average lengths of stay; (2) older visitors are often left behind on guided walks because interpreters set too rigid a pace; (3) due to the formal structure of activities, seniors often miss out on opportunities for interaction with others -- something they apparently enjoy very much, particularly with others of comparable age (Bultena, et al., 1977).

Activities developed exclusively for children can be geared toward participants' stage of development and the social context of their participation (Machlis & McDonough, 1978). While a discussion of developmental growth is beyond the scope of this report, it is important to note that children change physically, socially and emotionally throughout childhood. These changes should be considered when preparing interpretive programs.

The social context of childrens' involvement in park activities is also important. Group composition, size and purpose are key indicators of the social nature of childrens' groups (Machlis & Field, 1974). Organized groups, with pre-established social networks (e.g. scout or school groups) respond differently than loose collections of strangers. Large groups tend to be more physically active than small groups. Effective interpretation is organized to "complement" the social context of the group.

Example: Rather than produce a brochure explaining energy relations in Round Lake State Park, an interpreter develops a booklet entitled, "Children, Energy and Round Lake State Park: A Guidebook for Parents." The booklet suggests ways for parents to teach their children energy concepts exemplified by park features.

3. Energy Interpretation

This section of the guide deals with the special problems associated with energy interpretation. Many energy concepts are abstract and difficult to understand; this makes their interpretation especially challenging.

An example is entropy. Entropy refers to the process of disorganization, where intense energy flows (say the heat from a coal-fired boiler) are slowly dissipated (through radiators into rooms) until the energy flow is so diffuse that man can no longer make use of it (when the heat in the room escapes into the atmosphere as waste). The laws of physics state that throughout the universe, entropy is continual, inevitable, and irreversible.

This is a difficult idea to interpret. Entropy is a process, but unlike erosion, growth, and other natural processes, it cannot be directly observed. It is irreversible, which conflicts with our culture's mechanistic orientation that things are reversible through technology. Its definition changes, since the waste heat leaving a smokestack in one country may in another country be piped to heat buildings, and no longer be waste heat. Further, the scale of entropy — a universal process — is difficult to grasp.

Hence, it is not surprising that interpreting concepts like entropy is a challenge. Since entropy cannot be observed, special analogies and metaphors are necessary, using arrows, lines on a paper, colored balls, marbles, or whatever to symbolize what is occurring. The accuracy and choice of symbols is important, and many school science curriculums, science museums and energy education texts have good examples (see annotated bibliography).

A second problem is the sheer complexity of energy issues, which requires effective energy interpretation to go beyond superficial or one-sided explanations. Hard experience has taught us that new energy sources often have undesirable impacts, whether it be hydroelectric (the flooding of timber and recreation resources), nuclear (safety and waste disposal), or coal (air pollution). Alternative energy forms like wind energy systems

will also have problems, and these will need to be interpreted. Modern windmills, for example, raise questions about wind rights, visual pollution, t.v. and microwave interference and utility policies. The complexity of energy issues makes it necessary for interpreters to research their programs with special thoroughness.

A third problem unique to energy interpretation is the lack of scientific or political consensus, i.e. widespread disagreement over theory, method, policy and practice. Equally qualified scientists have disagreed over the safety of nuclear power since the beginnings of the Atomic Energy Commission (Stogaugh & Yergin, 1980). There is widespread disagreement over the reality of the energy crisis, and what to do about it. At the height of the OPEC oil embargo, only 66% of the population of the nation felt that energy shortage problems were serious (Craig et al., 1976)! Interpretive programs that assume visitors share a common perspective on energy issues may not reach large portions of their audiences.

There are practical solutions to these problems. Abstract concepts can be treated by using careful representations. Interpreters unfamiliar with energy issues can learn from a variety of sources, many listed in the appendix of this guide. Issues can be treated by presenting the costs and benefits of each approach. The visitor can be encouraged to look further, and make personal decisions. Interest groups can be invited to present their arguments, with opposing viewpoints also represented. In all cases, content should relate to the visitor's experience. Milstein, in writing about public involvement in energy policy, states:

> The best way to approach educating the public about energy is to present the issues in a personal context, explaining to people how energy problems will affect them in their homes or at their jobs. (1979:53)

In Section II we noted the importance of developing interpretive themes. We emphasized that a theme is an answer to the question, "so what". Often interpreters confuse theme (message) with topic (subject matter) and suffer organization problems in interpretation. For example, "nutrient energy" is not a theme; it offers no answer to the question, "so what?". Rather it delimits the subject matter of a message and narrows the

field of appropriate themes. Themes for the topic of nutrient energy might include: (1) nutrient energy is a crucial limiting factor in the forest, (2) death is essential in the recycling of nutrient energy, or (3) rocks are the parents of tomorrow's soil. In each case a different point is made relative to the topic, nutrient energy.

Parks have a distinct character, physiography and microclimate. Environmental features, cultural history and a host of other site-specific attributes will suggest which energy topics are suitable to a park. For each topic, interpreters need to decide which themes need to be emphasized. Below are examples of themes which might be stressed in three types of park environments. The hypothetical topic is "energy in the home."

1. Topic: Energy in the home.

   Environment: Forest

   Theme: Forest animals conserve energy through efficient insulation of their homes: man can do likewise.

   Example: An interpreter leads a guided walk showing visitors examples of animal homes and pointing out the ways energy is conserved through insulation. Parallels are drawn between animal homes and human homes.

2. Topic: Energy in the home.

   Environment: Desert

   Theme: Desert animals are lightly colored to reflect the sun and darkly colored to absorb its heat. Man can also use color to regulate heat.

   Example: A visitor center display is developed which exhibits mounted animal skins and explains the function each plays in heat reflection or absorption.

3. Topic: Energy in the home.

   Environment: Riparian

   Theme: River mammals such as the beaver and otter carry their insulation with them. Could man do the same?

   Example: An interpreter presents an evening slide talk showing heat-saving adaptations in common river mammals. He then engages the audience in a discussion of whether humans can technically accomplish the same ends.

4. Energy Interpretation in Idaho: An Energy Profile

By our earlier definition, the presentation of information that is "close to home" is a requirement of effective interpretation. This section of the guide profiles Idaho's energy situation. First, Idaho's energy consumption is surveyed, followed by a brief description of energy production. Next, the attitudes of Idahoans toward certain energy issues are presented. Finally, the use of such energy facts in interpretation is discussed.

1. Consumption

In 1978, Idaho consumed 241 trillion British Thermal Units (BTU's). This is equal to Grand Coulee Dam's total electricity production over the last fourteen years. While significant, this is only .3% of America's total energy use, and reflects the state's sparse population and relative lack of industrial development. Table 1 shows consumption levels by the kind of use each energy source was put — residential, commercial, industrial and transportation. The industrial and transportation sectors consumed 70% of the state's energy total, with the residential sector (home heating, appliances, lighting and so forth) consuming 18%. By fuel type and by end use sector, Idaho's consumption is varied, except for the relatively small use of coal.

The consumption of each energy source varies with special Idaho conditions. Ninety percent of oil consumption in the state is of "light fuels" (gasoline, distilled oil and propane), a much higher proportion than other states. Hence, consumption is tied to the transportation sector and the travel habits of Idahoans.

Table 1. Idaho Energy Consumption by End Use Sector (1978) (Trillion BTU's)

Sector	Natural Gas	Petroleum	Electricity	Coal	Total	% of Total
Residential	7.88	17.41	16.42	.90	42.61	18%
Commercial	5.60	10.52	12.39	.48	28.99	12%
Industrial	33.43	20.33	21.64	9.12	84.52	35%
Transportation	---	84.67	---	---	87.87	35%
Other *	.04	.01	.28	---	.33	---
Total	46.95	133.14	50.73	10.50	241.32	100%
% of Total	20%	55%	21%	4%	100%	

* Includes fossil fuels used to generate electrical power, and the electricity used by public authorities.

Source: Finn, 1980, pg. 4.

Figure 1 shows petroleum use since 1958, with the impact of the OPEC oil embargo and price increases clearly evident.

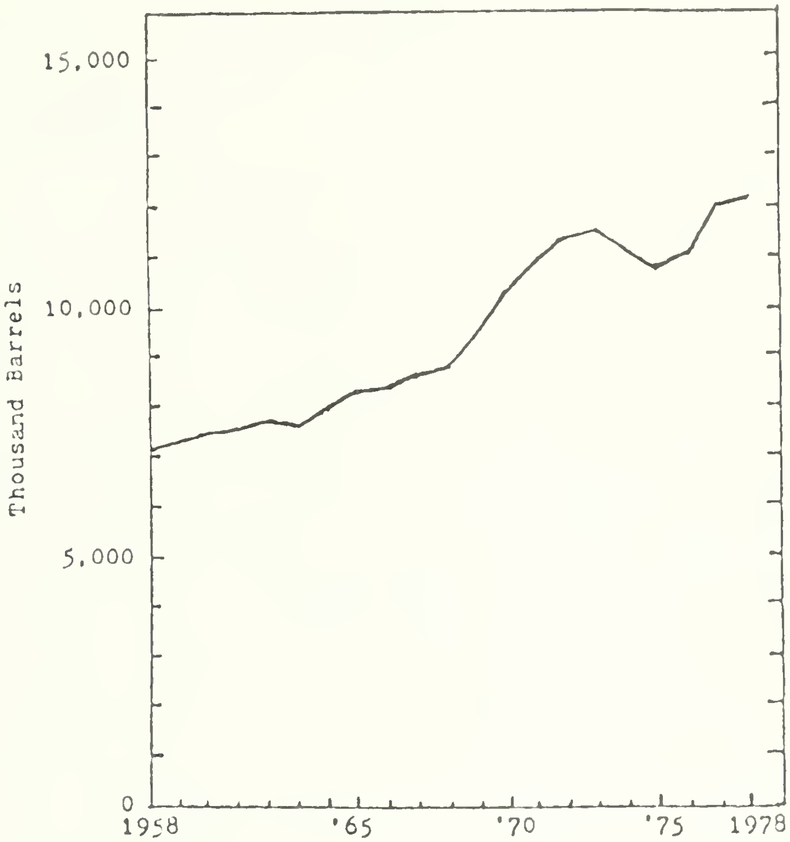
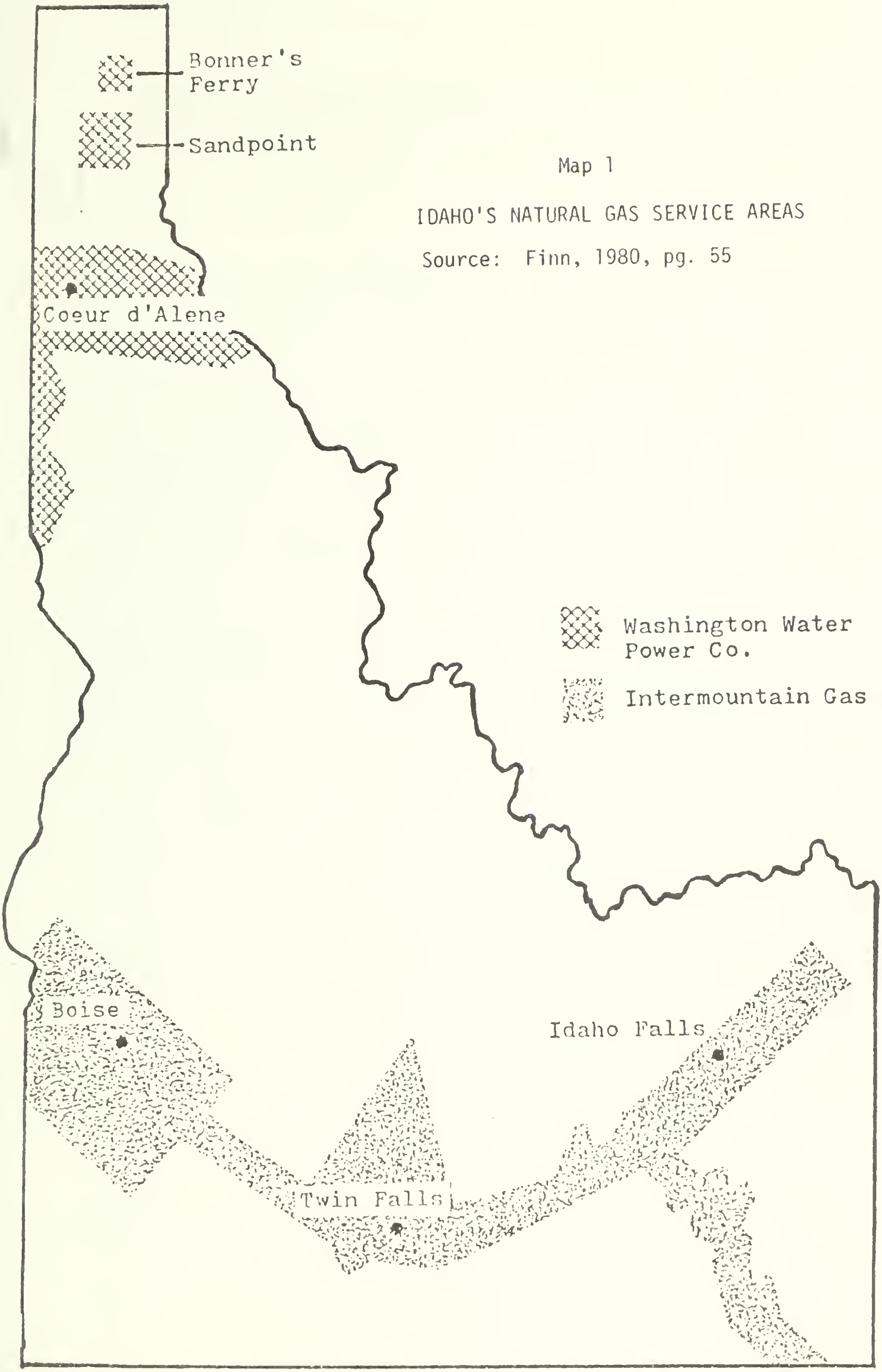


Figure 1. Idaho's Petroleum Supply (1958-1978)

Source: Finn, 1980, pg. 22

Idaho's natural gas supply is delivered by the Northwest Pipeline Corporation, and Map 1 shows the distributors and areas served with this fuel. Consumption has recently been decreasing, due to Canadian gas price increases and the substitution of other energy sources for natural gas. Industry was the largest consumer in 1978, using 71% of the natural gas supplies, followed by residential (17%) and commercial users (12%).



Map 1

IDAHO'S NATURAL GAS SERVICE AREAS

Source: Finn, 1980, pg. 55

Coal is not widely used in Idaho, and no electric utility uses this source for electrical generation within the state. Table 2 shows a vast majority of the coal consumption is in the industrial sector, where conversion from natural gas to coal is possible for some activities.

Table 2. Idaho's Coal Consumption by End Use Sector (Thousand Short Tons)

Year	Residential	Commercial	Industrial	Electric Utilities	Total
1977	65	31	378	---	474
1978	36	19	365	---	420
1979 (first half)	14	6	268	---	288

Source: Finn, 1980, pg. 90

Electricity consumption has steadily increased, and in 1978 accounted for 21% of total demand. Table 3 illustrates the steady increase since 1974, though commercial and industrial use declined from 1977 levels. The residential sector is a significant (31%) user of electricity.

Table 3. Idaho Electricity Sales (1974-1978) (Thousand KWH)

Utility Type	1974	1975	1976	1977	1978
Private (Investor-Owned)	11,207,259	11,665,598	12,115,455	12,543,126	13,148,161
Municipal	547,519	609,548	655,617	678,737	701,965
Rural Electric Co-op	615,832	654,178	740,101	807,943	873,376
Total	12,370,610	12,929,324	13,511,173	14,029,806	14,723,502

Source: Finn, 1980, pg. 111

2. Production

Idaho is not a major producer of energy. Finn states:

> Idahoans must import almost 3/4 of their energy supply, and though some potential exists for the state to exploit its fossil fuel reserves, hydro power will remain its only significant indigenous source of conventional energy. (1980:3)

For example, Idaho has no petroleum refining capacity, and must import all petroleum products from other states. No significant supplies of oil or natural gas have been discovered in Idaho, though the eastern part of the state (part of the Idaho-Wyoming Thrust Belt) may have small exploitable reserves in the future. Idaho also produces no coal, though statewide reserves of 4.4 million short tons (31st among the states) have been identified. Development is unlikely, due to more abundant and economical sources in the West.

Idaho does produce electricity, and 98% of this production comes from hydroelectric power plants. There are four major producers: private utilities, non-utility industries which "co-generate" their own power, municipal utilities and the federal government. Table 4 shows electric power production by utility type, with the federal government and private utilities supplying the majority of Idaho's electricity.

Idahoans have their electric power distributed by private utilities, rural electric cooperatives and municipal electric utilities. Although private utilities provide the vast majority of distributed electricity, the rural cooperatives are of great importance to the state's agriculturally based economy.

Table 4. Idaho Electric Power Production by Utility Type (1976-1978) (Thousand KWH)

Year	Private Utilities	Industry (Co-generation)	Municipal Utilities	Federal Government	TOTAL
1976	4,182,778	Unavailable	49,874	3,466,779	7,699,431 **
1977	2,908,872	135,950	48,027	2,209,307	5,302,156
1978	3,813,523	140,589	59,588	3,464,211	7,477,911
Avg % of Total ***	52.90	1.99	.77	44.34	100.00

* Excludes power generation at Brownlee, Oxbow, and Hells Canyon

** Excludes industrial co-generation.

*** Estimated

Source: Finn, 1980, pg. 158

3. Idahoan's Attitudes Towards Energy Issues

Since the beginnings of the energy crisis, a variety of polls have been taken to measure public attitudes toward energy issues. A survey conducted in late 1977 provides some information on the attitudes of Idaho citizens (Sargent et al., 1979). Respondents were asked about the acceptability of several energy conserving activities, and the results suggest that certain forms of conservation may be more adoptable than others in the state.

Table 5 shows the acceptability of several household conservation measures. Requiring insulation in new homes was very easy to accept by 72% of those surveyed, while lowering thermostats to 65° in winter was disapproved by 62%. Predictably, Sargent, et al., report that older citizens found it more difficult to accept these measures.

Table 5. Acceptability of Alternatives for Use, Conservation and Development of Energy in Idaho: Household Use.

Alternative (In Order of Acceptability)	Very hard to Accept	Somewhat Hard to Accept	Don't Know	Somewhat Easy to Accept	Very Easy to Accept	Means[1]
Requires heavy insulation in new homes	2	3	3	21	72	4.588
Air conditioning to cool no lower than 85° in summer	6	16	8	27	44	3.868
Close off 2-3 rooms of your home and only heat them to 50° in winter	20	18	6	27	29	3.277
Heat no higher than 65° in winter months	28	34	3	22	14	2.594

[1] The higher the mean the more acceptable the alternative. Responses ranged from (1) "very hard to accept" to (5) "very easy to accept." The mean represents the average response on each alternative.

Source: Sargent, et al., (1979:14)

Table 6 is a similar chart, though here the issues are related to energy development. Most Idahoans support the development of solar and geothermal energy (81% for solar and 75% for geothermal); attitudes toward conventional sources are mixed. Coal-fired plants, for example, were accepted by 52% of the sample, rejected by 29%, and 19% had no opinion.

Table 6. Acceptability of Alternatives for Use, Conservation and Development of Energy in Idaho: Energy Development

Alternative (in order of Acceptability)	Very Hard to Accept	Somewhat Hard to Accept	Don't Know	Somewhat Easy to Accept	Very Easy to Accept	Means[1]
	Percent responding in each category					
Develop solar heating for homes & businesses	3	5	12	26	55	4.269
Develop geothermal heating for homes & businesses	2	3	20	26	49	4.158
Develop more hydroelectric power plants	8	10	18	26	38	3.760
Develop nuclear generation plants	12	9	22	24	33	3.568
Develop coal-fired plants	16	13	19	27	25	3.316

[1] The higher the mean the more acceptable the alternative. Responses ranged from (1) "very hard to accept" to (5) "very easy to accept." The mean represents the average response on each alternative.

Source: Sargent, et al., (1979:17)

Not all citizens reacted the same to each issue. The authors write:

> Responses to these alternatives varied by length of time in state, education, income, age, orientation towards the utilization or preservation of natural resources, annual population growth rate thought desirable for the state, and the importance attached to pollution and energy needs in the siting of new industry. (1979:10)

This profile suggests several avenues for energy interpretation in Idaho. The dynamic nature of state consumption levels can be used to lead off programs on conservation and energy planning. The fact that Idaho imports its energy is significant for its economic and political consequences. Rising electrical demand in the residential sector can be tied to interpretation dealing with building design, insulation and efficiency.

The attitudes of Idahoans provides several insights useful to the interpreter. The high number of undecided citizens (22% dealing with nuclear development) underscores the basic need for energy interpretation. Where a consensus is clearly lacking (i.e. over development of conventional energy sources), presentation of opposing viewpoints is apt to be educational, interesting, and relevant to park visitors. The fact that age, education, income and other variables influence attitudes suggests a diversity of program types will be most effective.

5. Conclusion: The Rhetoric of Energy

In this guide, we have attempted to describe effective approaches to energy interpretation. We argued that such efforts are important, and that benefits include an informed public, the potential for energy conservation, and increased enjoyment for state park visitors. We described several basic interpretive principles, and argued that they are applicable to energy interpretation. We suggested that energy interpretation is especially challenging, since many of the concepts are abstract, the issues complex, and disagreements many. Idaho's current energy situation was profiled, and several appropriate interpretive themes were described.

An additional issue remains. As in all human communication, the words chosen to represent energy ideas carry special meanings. We may choose to call events at the Three Mile Island Nuclear Power Plant an accident or an incident; our choice of terminology reflects our values. There is a rhetoric of energy, used to persuade us that profits are "windfalls," rationing is merely "allocation," and that nuclear waste is really "surplus." The interpreter must deal carefully with these words, knowing that rhetoric often confuses rather than clarifies. With the importance attached to energy interpretation, clarity is perhaps the most important goal of all.

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1977 Interpretation for the elderly: a study of the interpetive interests of retired national parkgoers. National Park Service, Cooperative Park Studies Unit. College of Forest Resources. Seattle, WA: University of Washington.

Cheek, N.H., Jr.; W.R. Burch, Jr.
1976 The social organization of leisure in human society. New York: Harper & Row, Inc.

Craig, P.; J. Darmstadter; S. Rattien
1976 Social and institutional factors in energy conservation. Annual Review of Energy:1.

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1974 A summary and annotated bibliography of communication principles. J. Environmental Education. 5(4):8-13.

Field, D.R.
1971 Interchangeability of parks with other leisure settings. Paper presented to American association for the advancement of science symposium. Philadelphia, PA.

Field, D.R.; J.A. Wagar
1973 Visitor groups and interpretation in parks and other outdoor leisure settings. J. Environmental Education. 5(1):12-17.

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Ham, S.H.
1979 Potential contributions of cognitive psychology to interpretive research. Located at: Department of Wildland Recreation Management, University of Idaho, Moscow, ID.

1978 An exploratory study of on-site interpretation at Northwest Trek. Pullman, WA.: Washington State University. Thesis. 82 pg.

Lewis, W.J.
So you're going to be an interpreter. National Park Service. Washington, D.C.: Division of Interpretation and Visitor Services. In preparation.

Machlis, G.E.
1975 Families in parks: an analysis of family organization in a leisure setting. Seattle, WA: University of Washington. Thesis. 122 pg.

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1974 Getting connected. Trends. 7-8.

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1978 Childrens' interpretation: a discovery book for interpreters. National Park Service, Cooperative Park Studies Unit. College of Forest Resources. Seattle, WA: University of Washington.

Milstein, J.
1978 Public attitudes, knowledge and behavior. In Social Sciences Energy Review. L.C. Gould, ed. New Haven, CT: Institution for Social and Policy Studies, Yale University. 1:3

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1971 Social psychology and contemporary society. New York, NY: John Wiley & Sons, Inc.

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1979 The acceptability of alternatives for the use, conservation and development of energy in Idaho. Idaho Agricultural Experiment Station. Moscow, ID: University of Idaho. No. 208

Sommers, P.; R.W. Clark
1977 ERDA and the diffusion of innovations - a concept paper. Mapping project on energy and the social sciences. New Haven, CT: Institution for Social and Policy Studies. 33 pg.

Stobaugh, R.; D. Yergin (eds.)
1979 Energy future. New York: Random House.

Tilden, F.
1957 Interpreting our heritage. Chapel Hill, NC: The University of North Carolina Press.

Wagar, J.A.
1972 The recording quizboard: a device for evaluating interpretive services. USDA Forest Service Research Paper. Portland, OR: Pacific Northwest Forest and Range Experiment Station. Technical Report PNW-139.

1974 Interpretation to increase benefits for recreation. USDA Forest Service. St. Paul, MN: North Central Forest Experiment Station. Technical Report NC-9

Washburne, R.F.; J.A. Wagar
1972 Evaluating visitor response to exhibit content. Curator. 15(3):248-254.

6. Annotated Bibliography

This annotated bibliography is designed to be a useful guide to the literature applicable to Energy Interpretation.

The literature is divided into sections on Interpretation, Energy Education, and Energy. The Interpretation section covers literature to help improve and evaluate your interpretive programs. The Energy Education section deals with various programs designed to communicate and interpret energy themes. The Energy section covers creditable sources of information concerning energy, energy resources and use, and the future of energy technology.

Interpretation

Alderson, W.T. and S.P. Low
1976 Interpretation of historic sites. Nashville, TN: American Association for State and Local History.

A book concerned with the practical problems of developing and conducting interpretive programs at historic sites. Includes guidelines for setting objectives through evaluation of the established program.

Beechel, J.
1975 Interpretation for handicapped persons. Seattle, WA: College of Forest Resources, Cooperative Park Studies Unit, University of Washington.

A handbook of interpretation for handicapped persons. Includes background about various handicaps and helpful hints for interpreters.

Boulanger, F.D. and J.P. Smith
1973 Educational principles and techniques for interpreters. USDA, U.S. Forest Service. Portland, OR: Pacific Northwest Forest and Range Experiment Station. General Technical Report. PNW-9.

A short (24 pages) and concise publication that outlines principles and techniques for effective talks and discussions.

Bultena, G.; D. Field and R. Renninger
1975 Interpretation for the elderly: a study of the interpretive interests of retired national parkgoers. Seattle, WA: University of Washington, Cooperative Park Studies Unit.

A paper that addresses the interpretive interests of the elderly. Useful for effective interpretation for elderly audiences.

Fabun, D.
1968 Communications: the transfer of meaning. Beverly Hills, CA: Glencoe Press.

A pamphlet (48 pages) that focuses on the concepts behind human communication, particularly the transfer of meaning.

Files, R.T.
(date unknown) Naturalist notes. Pacific Northwest Region. USDA, U.S. Forest Service.

A short (27 pages) publication that gives an overview of the basic considerations, principles, and practices for effective interpretation.

Grater, R.K.
1976 The interpreters' handbook. Southwest Parks and Monuments Association.

A basic handbook of proven methods, skills and techniques for interpretation.

Hanna, J. W.
1975 Interpretive skills for environmental communicators. College Station, TX: Texas A & M University, Department of Recreation and Parks.

A compilation of various articles and papers useful in developing meaningful interpretive programs. This compilation is intended to introduce the user to possibilities for program orientation and other sources of information.

Horn, E.L.
(date unknown) Talk tips. USDA, U.S. Forest Service.

A very concise and informative pamphlet (31 pages) that discusses many principles, ideas and procedures for conducting talks and informative programs.

Machlis, G.E. and D.R. Field
1974 Getting connected: an approach to childrens' interpretation. Trends. July, August, September.

Machlis, G.E. and M. McDonough
1978 Childrens' interpretation: a discovery book for interpreters. Seattle: University of Washington, Cooperative Park Studies Unit.

A booklet (28 pages) that serves as a handbook for developing effective and exciting interpretive programs for children. Includes a useful series of examples and applications.

National Park Service
1976 A personal training program for interpreters. Washington, DC: National Park Service, Division of Interpretation.

A training package, utilizing text and videotapes, designed to help new and experienced interpreters improve their skills and understanding of interpretation.

The following are put out by the National Park Service, Visitor Services Training Series.

Gregg, H.R. (revised by D. Hubbard and W. Dunmire, 1968)
1955 Campfire program.

A pamphlet (20 pages) that serves as a guide for conducting campfire programs.

Kay, W.K.
1970 Keep it alive!

A pamphlet (28 pages) that gives valuable and informative tips on conducting living history demonstrations.

Manucy, A.
1968 Say, ranger...

A pamphlet (16 pages) that outlines important points for performance and operations at an information center.

Stagner, H.R. (revised by D. Thompson, Jr., 1968)
1953 Talks

A pamphlet (20 pages) that outlines the important points to consider for effective public speaking.

Renninger, E.R.
1977 An interpreter's guide to retired visitors. Seattle, WA: University of Washington, Cooperative Park Studies Unit.

A paper useful for insight about important concepts concerning retired persons' needs and motivations and how interpretation can be most effectively accomplished.

Sharpe, G.W.
1976 Interpreting the environment. New York: John Wiley & Sons, Inc.

A book by experts on various aspects and techniques of interpretive services and facilities. A useful guide for developing new or revamping old interpretive programs.

Smithsonian Institution
1977 Museums and handicapped students - guidelines for educators. Washington, D.C.: Smithsonian Institution.

An important book for helping to remove the barriers that handicapped individuals face at museums. Useful for insights to barriers that handicapped individuals face in various interpretive programs.

Tilden, F.
1977 Interpreting our heritage. Chapel Hill: The University of North Carolina Press.

The classic work on the principles of interpretation. Six principles are explicitly discussed, not as methodology but as the guiding principles and underlying philosophy of the interpreter's art and craft.

Wagar, A.T.; G.W. Lovelady and H. Falkin
1976 Evaluation techniques for interpretation: study results from an exhibition on energy. USDA, U.S. Forest Service. Portland, OR: Pacific Northwest Forest and Range Experiment Station. Research Paper PNW-211.

A study of six techniques for evaluating interpretive presentations. This particular study was done on an exhibition on energy and provides some useful insight to evaluation of energy-oriented interpretation.

Energy Education

Brown, W.E.
1971 Islands of hope. Washington, D.C.: National Recreation and Park Association.

This book discusses the role of the park and recreation profession in this time of environmental crisis. Focus is on factors, means, and resources for instituting environmental reform.

Energy & Man's Environment
1978 Energy and conservation education - activities for the classroom. Portland, OR: Energy & Man's Environment.

A series of learning activity packages for Grades 1-12 that is based on a framework of goals and objectives essential to an understanding of energy and energy-related environmental issues.

Fowler, J.M.
1975 Energy-environment source book. Washington, D.C.: National Science Teachers Association.

A comprehensive sourcebook of information on energy and its interaction with society and the environment. Written for teachers who wish to incorporate material on the complex subject of energy into their teaching.

Idaho Office of Energy
1979 Idaho energy conservation resource guide for environmental education, Grades 7-12. Boise, ID: Idaho Office of Energy

An interesting approach to energy-oriented environmental education programs for Grades 7-12. Includes set education goals and activities for goal accomplishments.

National Park Service
1979 Some ideas on energy interpretation. Seattle, WA: National Park Service, Pacific Northwest Region.

A book consisting of various ideas for energy interpretation from National Park Service sites throughout the Pacific Northwest.

National Science Teachers Association
Energy and education. Mary T. McGuire, ed. Washington, D.C.: National Science Teachers Association.

A bi-monthly newsletter concerning energy education. Valuable for keeping up-to-date on energy education developments and workshops. Newsletter subscriptions are free.

National Science Teachers Association
(date unknown) Energy education workshop handbook. Washington, D.C.: U.S. Department of Energy.

A handbook for conducting workshops for those interested in leading workshops in energy education. Outlines use of materials produced by the Project for an Energy-Enriched Curriculum.

Oliver, R.N. (ed.)
1971 Museums and the environment: a handbook for education. New York: Arkville Press.

A good reference book for mounting exhibits or initiating educational projects to make the public aware of environmental problems and the means for their solutions. Includes how-to-do-it instructions, discussion of themes, and sources of reference materials.

Stephenson, L.
1976 Energy manual for parks. Arlington, VA: National Recreation and Parks Association.

A handbook for interpreters and naturalists that gives information about energy use by nature and people. Designed to provide information useful to help park visitors gain a new understanding of energy, both in the park and at home.

Tanner, R.T.
1974 Ecology, environment and education. Lincoln, NE: Profesional Educators Publications, Inc.

A book designed to point out the relevant issues in environmental education. Includes a chapter on programs and instructional materials and a look at professional development in environmental education.

U.S. Department of Energy
1978 Citizens' workshops on energy and the environment handbook. Washington, D.C.: U.S. Department of Energy.

A pamphlet (32 pages) that describes the Citizen's Workshops and use of an energy-environment simulation for the workshops. The Environment Handbook section is a primer on energy and the environment.

Van Matre, S.
1972 Acclimatization. Martinsville, IN: American Camping Association.

A sensory and conceptual approach to ecological involvement. Includes discussion and details of a program to immerse campers in the natural environment.

1974 Acclimatizing. Martinsville, IN: American Camping Association.

A personal reflective approach to a natural relationship. An in-depth program of exercises and techniques for developing awareness of the natural environment.

Energy

Cook, E.
1976 Man, energy, society. San Francisco, CA: W.H. Freeman & Co.

A geographic view of energy that will provide a background necessary for an understanding of contemporary energy problems.

Cottrell, F.
1955 Energy and society. New York, NY: McGraw-Hill.

A book that discusses how energy systems have social impacts. Analysis is based on an understanding of how geography, energy costs, and social organizations are intertwined.

Finn, M.W.
1980 Idaho energy facts. Boise, ID: Idaho Office of Energy.

A comprehensive review of Idaho's energy situation to include facts and statistics about energy consumption, sources, and trends with brief overviews of the energy resource itself.

Gore, B.N.
1979 Energy project. Boise, ID: Idaho Parks & Recreation Dept.

A booklet (27 pages) that describes the major areas where energy savings may be possible or where renewable energy sources might be applicable at Idaho Park & Recreation sites.

Houston, O.P.
1978 Energy conservation. Trends. Winter, 1978, 15(1):13-16.

An article that discusses energy conservation and the present energy conservation program that the National Park Service is involved in.

LaForce, J.C.
1978 The energy crisis: the moral equivalent of bamboozle. Los Angeles, CA: Green Hill Publishers, Inc.

A treatise (25 pages) on the political and economic history of the "energy crisis." Primarily addresses economic policy.

Lovins, A.B.
1977 Soft energy paths. New York, NY: Harper & Row Publishers, Inc.

A look at the potential and rationale for an alternate technological approach to present-day energy technology. A well organized, clearly expressed, and extensively documented discussion of the alternatives to such "hard paths" as nuclear energy and rapid expansion of fossil fuel production.

Northwest Energy Policy Project
1978 Energy futures northwest. Portland, OR: Northwest Energy Policy Report.

A report of the findings concerning Northwest energy policy options. Includes overviews and analysis of the scenarios for various options available.

Pizzadili, J. and C. McKetta
1979 Idaho's wildland resources; availability and use. Moscow, ID: University of Idaho, Forest, Wildlife and Range Experiment Station. Miscellaneous Publication #8.

This document is a collection of published wildland resource use and availability statistics for Idaho. The Water Resources section and related tables (Tables V-5 through V-9) give useful information concerning hydroelectric sites.

State of Idaho
1977 Idaho almanac. Boise, ID: Executive Office of the Governor and Idaho Division of Tourism and Industrial Development.

An almanac of Idaho's history, government and politics, resources, economy, culture, etc. A section on utilities includes information on electric power and natural gas.

Stobaugh, R. and D. Yergin (eds.)
1979 Energy future. New York: Random House.

An up-to-date and relevant report of the Energy Project at the Harvard Business School. The most recent and comprehensive analysis of the U.S. energy situation, how we got there, and alternatives for the future and a balanced energy program.

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Moscow, Idaho 83843

Wildland Recreation Management

NATIONAL PARK SERVICE
Department of the Interior